ALUM CREEK EXPERIMENTAL FOREST

Short history/brief introduction: The 4,659-ac Alum Creek Experimental Forest (ACEF) was established in the late 1950s in the headwaters of the Saline River near Jessieville, AR. Until the mid-1980s, the ACEF was primarily used to study the effects of different silvicultural practices on forest hydrology. During this time, ten small research watersheds (from one to 30 ac in size) and two weather stations were established within the ACEF for monitoring streamflow, water quality, precipitation, air temperature, and other hydrometeorological variables. In 1994, the ACEF area was included within the area utilized for the landscape-scale Phase III of the Ouachita Mountains Ecosystem Management Research Project. Half of the ACEF is being used as an unharvested control area, while a nearly 1500-ac block is being subjected to extensive uneven-aged reproduction cuttings covering. Since the early 1990s, the research scope and pace has expanded greatly and now includes a wide variety of research studies in aquatic ecology, pedology, terrestrial ecology, silviculture, and wildlife biology. Four nested streamflow gauging stations with catchments between 300 and 3,000 ac have been established during this time to supplement the existing hydrometeorological network. Currently, the CEF is managed by SRS-4106, Southern Research Station, and is affiliated administratively with the Jessieville and Winona RD (compartments 1457 and 1460) of the Ouachita NF.

Climate: The ACEF climate is humid subtropical with hot, humid summers and mild winters. Mean daily temperatures range from 30 to 94 F. Mean annual precipitation is 52 inches, occurs almost entirely as rain, and is fairly uniformly distributed throughout the year.

Soils: Soils typically fall within the Carnasaw, Townley, or Pirum map units. They are well drained, moderately deep to deep, gravelly to stony loam soils that occur on undulating to steep hillslopes, ridges, and colluvial areas.

Vegetation type(s): The ACEF includes a mosaic of pine-hardwood, predominantly pine, and predominantly hardwood stands. Shortleaf pine (*Pinus echinata* Mill.) is the primary pine species whereas hardwoods include white oak (*Quercus alba* L.), red oak (*Q. rubra* L.), and various hickories (*Carya* spp.).

Long-term data bases: The ten small watersheds within the ACEF have hydro-meteorological data series that run from 20 to 40 years. Three of the stations are still being operated as long-term baseline stations. A comprehensive vegetation inventory throughout the entire ACEF and adjacent Phase III research area that was completed in 199x provides a unique data source for tracking floral conditions and changes over time.

Research – past and current: Studies both past and present are investigating the effects of different silvicultural practices on small-basin streamflow yields and water quality; erosion and sediment delivery from forest roads.; nutrient export in streamflow from small watersheds; shortleaf pine silviculture; aquatic ecosystem processes and response to silvicultural practices; the effects of different silvicultural practices on landscape-scale streamflow and water quality characteristics; effects of pine-bluestem restoration

practices on vegetation, soils, streamflow, and water quality characteristics; and pedologic effects of forest management for different desired conditions.

Major research accomplishments and impacts on management: Identification of the magnitude and duration of streamflow and water quality changes resulting from different silvicultural practices in small watersheds; quantification of forest road erosion and sediment delivery to adjoining streams; characterization of nutrient status and export from small forest watersheds; characterization of aquatic ecosystem structure, processes, and response patterns to natural and anthropogenic disturbances; and compilation of long-term hydrometeorological data series representative of small forest watersheds in the Ouachita Mountains.

Collaborators: The Ouachita National Forest has been close and active partner in ACEF research since its beginning. Since 1979, the Weyerhaeuser Company has been a major collaborator providing additional personnel, instrumentation, logistic support, and field sites to expand many of the ACEF investigations. University cooperators include the University of Arkansas-Monticello, Oklahoma State University, the University of Arkansas, Mississippi State University, the University of Oklahoma, Texas A&M University, and the University of Kentucky have participated in several new hydrologic and pedologic studies.

Research opportunities: The long-term hydrometeorological data sets, extensive hydrometeorological monitoring network, comprehensive vegetation inventory, year-round access, and existing support facilities mean that tremendous opportunities exist within the ACEF for research in terrestrial forest ecology, hydrology, pedology, geomorphology, aquatic ecology, and silviculture.

Facilities, contact address, website address, location: Forest Service facilities consist of a secure storage lot within the ACEF; and a work center in Jessieville (~ 10 miles away) that has an office, shop, storage space, off-road vehicles, and computer facilities.

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